

# A Steatite Crucible Containing Ten Tarring Pebbles: Implications for Waterproofing Cuyama-Style Baskets

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## Abstract

Attention to a short-handled, steatite crucible, its bowl cradling 10 tarring pebbles when discovered at the Malaga Cove site (CA-LAN-138), precipitates novel ideas regarding the waterproofing of Cuyama-style containers. Broached here are the suggestions that some Gabrielino (Tongva) and Chumash craftswomen tar-coated the interior walls of Cuyama water bottles either by: (1) pouring a mix of molten mastic and hot tarring pebbles from a crucible through a receptacle's opening and then setting the mix in rotational motion; or (2) pouring molten tar into a container followed with the addition of heated pebbles and then swirling the contents. Such proposals are at variance with the ethnohistorically and ethnographically documented practice wherein hot pebbles were dropped onto unheated pieces of asphaltum resting at the inside bottom of a Cuyama-style basket, thus initiating melting.

Thought is also given to potential difficulties attendant to inserting pebbles and tar, but more so in extracting tarring pebbles and excess tar, through the small openings and necks of fully formed basketry water containers. Such considerations coupled with close reading of George Nidever's mid-nineteenth century observations of the basketry work of Juana Maria, the "Lone Woman of San Nicolas Island," inspires a further suggestion—pitching was accomplished prior to fully fashioning a bottle's neck, thus allowing more efficient entry and exit of pebbles and asphaltum.

## Introduction

Numerous primary sources, ethnohistoric, ethnographic, and archaeologic, acknowledge the Cuyama-style basket,<sup>1</sup> a twined, interior tar-coated, demijohn-shaped receptacle (Figures 1–3), used by the Gabrielino (Tongva) and Chumash mainly for the transport and storage of water<sup>2</sup> (e.g., Fr. Antonio de la Ascención [Bolton 1916:88; Wagner 1929:237]; Miguel Costansó

[Hemert-Engert and Teggart 1910:44–45; Brandes 1970:91]; Pedro Fages [Priestly 1937:52]; Fr. Juan Viscaino [Woodward 1959:18]; Archibard Menzies [Eastwood 1924:326]; George Nidever [1961a:20, 1961b:43–44]; Carl Dittman [1961:8]; Hugo Reid [Bancroft 1874:408; Putnam 1879:246; Heizer 1968:44–45]; Alexander Taylor [1863:171]; John P. Harrington [1942:22; Craig 1966:210, 1967:97–99; Heizer 1970:60, 67, Figures 1, 18; Hudson and Blackburn 1983:42–43]). It is the tar-coating of Cuyama-style baskets that is the specific focus of this article.<sup>3</sup>

Ethnohistoric and ethnographic sources describe a technique for applying bitumen to the insides of Cuyama-style water bottles; those data are in the section immediately following. A subsequent section describes a discovery from the Malaga Cove site (CA-LAN-138) (Figure 4), a steatite crucible, or melting pot (Figures 5 and 6), that contained 10 tarring pebbles when found. The crucible was discovered in an extensive feature among a great many other artifacts. Artifacts from that feature dubbed "Find No. 3" by the relic collector who discovered it, Thomas Tower I, are listed in a companion article by Koerper and Cramer that appears in this *PCAS Quarterly* double-issue.

The circumstance of 10 tarring pebbles in a short-handled crucible hints at the possibility of ways to waterproof Cuyama-style baskets other than what appears

in the ethnohistoric and ethnographic records. Accordingly, the section that follows description of the LAN-138 artifact explores those possibilities, but it also revisits aspects of the ethnohistoric observations of George Nidever (1961a:20, 1961b:43–44) to propose that tarring may have occurred prior to a water bottle having been completely woven.

Our article will finish with a summary plus concluding thoughts.

### **Tarring Cuyama-Style Baskets**

#### *Nidever's Ethnohistoric Account*

George Nidever recorded his eyewitness account of Juana Maria, the “Lone Woman of San Nicolas Island,” tar coating one of her Cuyama-style baskets:

One day, while out hunting, I came across her lining of the vessels she used for holding water. She had built a fire and had several small stones about the size of a walnut heating in it. Taking one of the vessels, which was in shape and size very like a demijohn, excepting that the neck and mouth were much longer, she dropped a few pieces of asphaltum within it, and as soon as the stones were well heated they were dropped in on the top of the asphaltum. They soon melted it, when, resting the bottom of the vessel on the ground, she gave it a rotary motion with both hands until its interior was completely covered with asphaltum. These vessels hold water well, and if kept full may be placed with safety in a hot sun [Nidever 1961a:20].

Similar documentation (Nidever 1961b:44), carries some important additional data, wherein one learns that after a basket's insides received an “even coating” of tar, the “surplus [tar], with the rocks, was thrown

out.” The implications of this observation are visited later in our essay.

Parenthetically, a water bottle made by Juana Maria (Figure 1) ended up ca. 1854–1857 with the California Academy of Sciences, San Francisco. Sadly, this and certain other possessions of the Lone Woman were destroyed in the 1906 earthquake and fire (see also Heizer 1960:Figure 1; Heizer and Elsasser 1973:frontispiece).

#### *J. P. Harrington's Ethnographic Notes*

Some of Nidever's ethnohistoric observations are mirrored in John P. Harrington's ethnographic notes from the scholar's interview with Ventureño Chumash informant Fernando Librado (Craig 1966:210, 1967:98). Upon completion of the weaving of a Cuyama water bottle, pulverized tar was placed inside, and six heated rocks, each about “2 in” in diameter were dropped one by one into the jug. The receptacle was manipulated so as to roll the stones and thus spread melted tar about the inner walls. Preparatory to this, mud would have been smeared thickly onto the outer surface of the container to prevent the melted tarry ooze from covering any parts of the outside surface. Some of Harrington's informants stated that the mud was washed away after the insides had been asphalted. Librado disagreed, saying that the leaking through was “made as one with mud,” and there it stayed.

#### *Notes Regarding Tarring Pebbles*

The above descriptions of tar pitching Cuyama-style baskets are reflected in Hudson and Blackburn's (1987:Item 443) definition of “tarring pebble,” that is, “a small, rounded, unmodified stone which is heated and used to apply a thin layer of asphaltum for waterproofing purposes to the inside of certain baskets.” A minor caveat observes that the stones do, however, become modified on initial employment, their asphaltum coatings thus conferring artifact status.

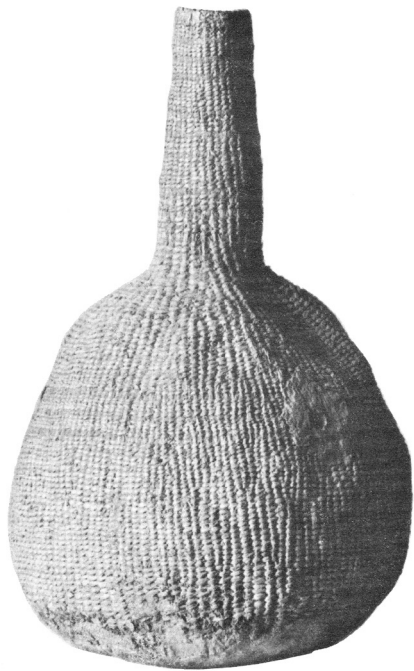


Figure 1. Cuyama-style water bottle made by Juana Maria, the “Lone Woman of San Nicolas Island.” Note asphaltum on the base but its absence at the opening and neck. Heizer (1960:2) described small daubs of tar on the outer surface that he believed were applied to plug leaks. Inside surfaces would almost certainly have been tarred. This twined basket was destroyed in the 1906 San Francisco earthquake and fire. Heizer estimated that it was ca. 25 cm in height and ca. 16 cm in diameter. Photograph reproduced from Heizer (1960:Figure 1, left).

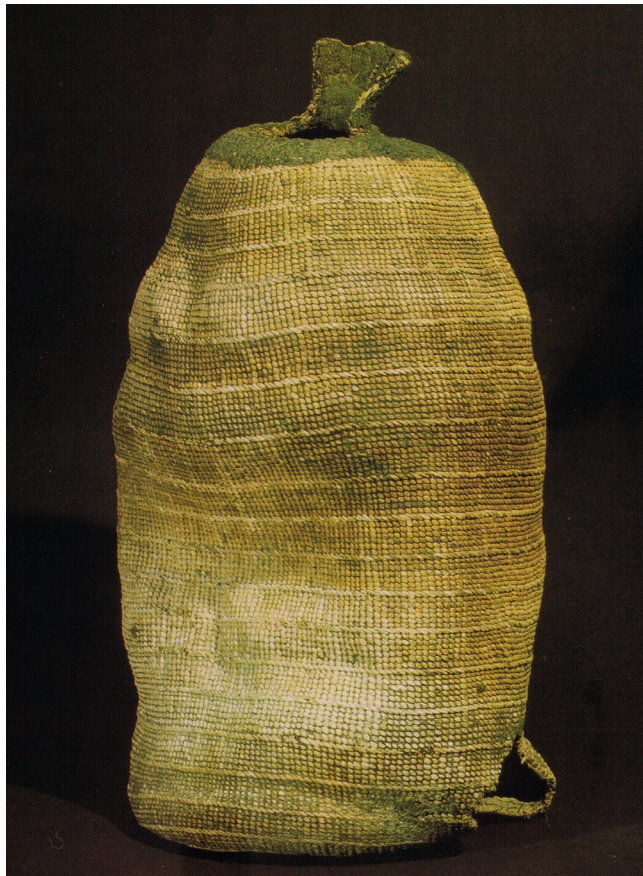


Figure 2. Chumash water bottle from the Cuyama Valley. Bowers Museum No. 8423. Ca. 46 cm tall and ca. 29 cm x ca. 24 cm in diameter. Reproduced from Rozaire (1977:31, Item 94) with permission of the Bowers Museum, Santa Ana. See also Lamb (1972:75) and Dederer (1976:21).

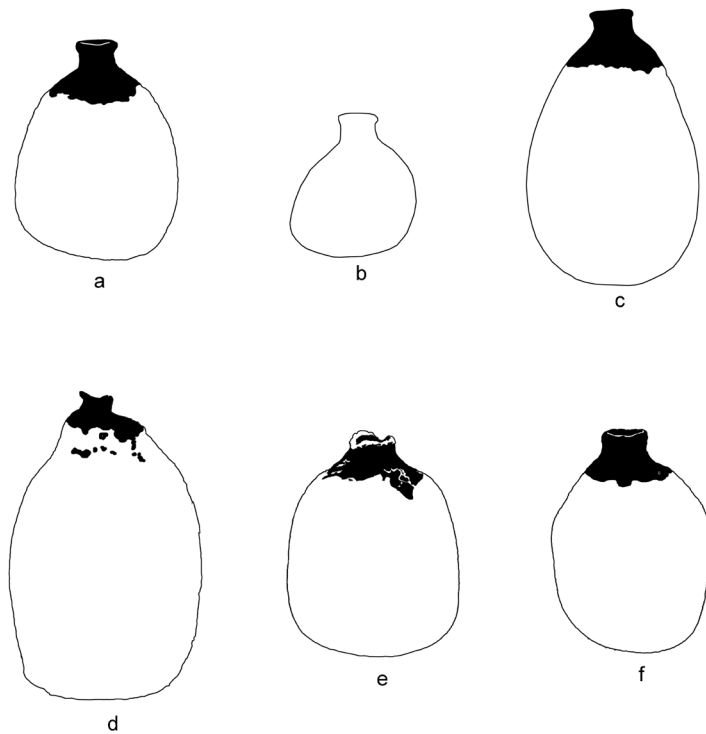


Figure 3. Cuyama-style Chumash water bottles; illustrating asphaltum around the openings and necks. (a, b, c, and d are scaled to size with one another). (a) Lowie Museum (LM) 1-14501; ca. 31 cm tall. After Mohr and Sample (1955:Figure 101A), see also Dawson and Deetz (1965:Plate 28c). (b) LM 1-14503; tar seems to be absent from neck; ca. 20 cm tall. After Mohr and Sample (1955: Figure 101C), also Kroeber (1925:Plate 53b). (c) LM 1-14499; ca. 39 cm tall. After Mohr and Sample (1955:Figure 101E), also Kroeber (1925:Plate 53e). (d) LM 1-14498; ca. 44 cm tall. After Mohr and Sample (1955:Figure 101D), also Kroeber ((1925:Plate 53d). (e and f are scaled to size with each other). (e) Southwest Museum – L-9; dimensions uncertain. After Dawson and Deetz (1965:Plate 28a). (f) LM 1-19436; dimensions uncertain. After Dawson and Deetz (1965:Plate 28b), see also Craig (1966:Figure 2, 1967:Plate 2B).

Tarring pebbles have long been considered *prima facie* evidence of basketry manufacture (e.g., Olson 1930:16–17). Koerper et al. (1991:54) inferred basket weaving at CA-SDI-9649, an eighth millennium BP site, based on the recovery of tarring pebbles. Early Holocene tarring pebbles occurred in Level 1 at LAN-138 (Walker 1937:213, 1951:39, 44, Figure 12); chronological data for the level do not extend into San Dieguito times (Koerper and Peterson 2014:48). Robust evidence indicating tar-coated basketry turns up in Middle Holocene times at San Miguel Island; Braje et al. (2005) discussed basketry impressions in asphaltum, and they noted that two tarring pebble features could date as early as 5130 cal BP. Velanoweth et al. (2003) reported that San Miguel Island asphaltum basketry impressions were dated to 4100 cal BP.

Hudson and Blackburn's definition ties the artifact explicitly to the water bottle since it identifies "water-proofing" as its purpose. With reference to basketry, it is conceivable that the tarring pebbles' service was

exclusive to the manufacture of water bottles, yet one might consider whether the artifact possibly served to melt relatively small amounts of mastic (asphaltum or an asphaltum and resin mix) stored as "bricks" or kept within shell receptacles. That is, when a small amount of glue was required, say, to adhere a disk bead onto a pendant, a heated pebble or pebbles could be set on the tar, soon followed by the melted tar being removed using some sort of applicator. In other words, while the tarring pebble had been a constant agent involved in melting, it was not necessarily an applicator in all cases.<sup>4</sup>

The storage dishes for asphaltum were often the shell of one or another species of abalone (e.g., Heye 1921:117, Figure 23; Anonymous 1937; Hudson and Blackburn 1987:172, Figure 441-1). Other shell species served the purpose; Rau (1876: cited in Abbott 1879:116) observed asphaltum stored in cockle shells and also in the shells of *Aequipecten circularis*, *Patella mexicana*, *Spondylus* spp., and *Panopea generosa*.

Koerper et al. (2005:88, Figure 1) picture a pecten shell from CA-ORA-119-A with asphaltum contained within, as well as a *Hinnites giganteus* specimen from CA-ORA-106 that had asphaltum residue on its inner surface. Koerper (1995:6–137) also documented a chione shell that held asphaltum, which his Cypress College students found at CA-ORA-378, or the Christ College site.

**Other Techniques for Tarring Water Bottles?**

**Introduction**

In 1941 relic collector Thomas Tower I (see Koerper et al. 2014) was searching the Malaga Cove site (LAN-138) (Figure 4), specifically Level 2 midden (see Walker 1951:51–60; Koerper and Peterson 2014),

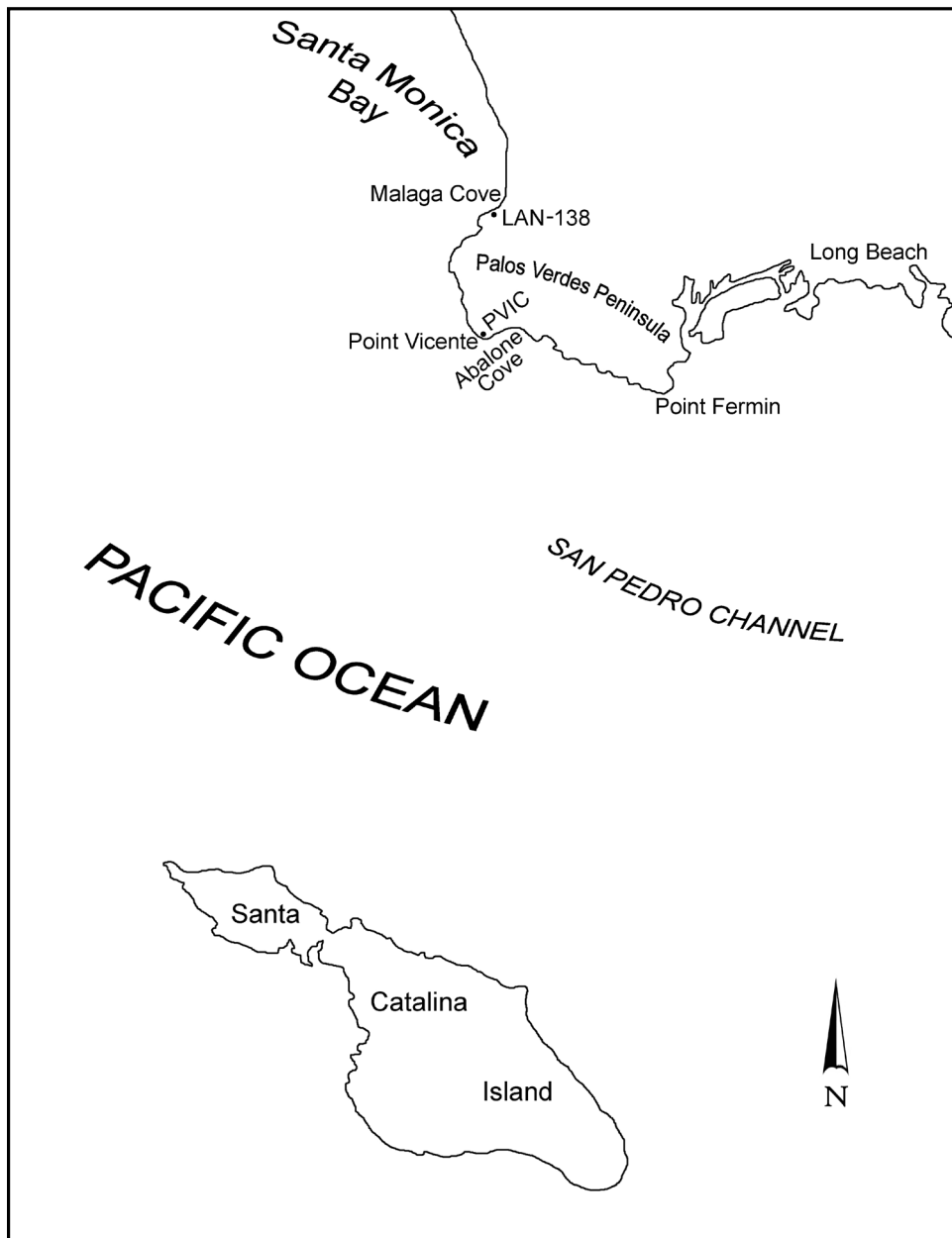


Figure 4. Location map.

when he encountered a feature with an extensive and varied inventory of artifacts dating to the late Del Rey Tradition (see Sutton 2010). Tower (1942) referred to his discovery as “Find No. 3” and also as “The Sunken Dwelling of the Chumash.” Detailed information regarding “Find No. 3” can be found in a companion article in this *PCAS Quarterly* double-issue, where Koerper and Cramer provide more specific context for the crucible; in so doing, they further emphasize the richness of material culture of the coastal Gabrielino at a time of increasingly intensive and extensive exchange between Catalina Island Tongva and mainland Tongva (see Sutton 2010: Table 1).

Among the objects in “Find No. 3” was the steatite asphaltum melting pot seen in Figures 5 and 6; it contained 10 tarring pebbles. The specimen’s distinctive shape allows immediate identification as a kind of crucible used by Gabrielino/Tongva and Chumash to process asphaltum for application especially as a mastic (adhesive and/or sealant) (see e.g., Abbott 1879:110; Hudson and Blackburn 1987:168–170; McCawley 1996:125, Figure 42). The melting pot may also be seen in a photograph taken by Thomas Tower I and published in Koerper et al. (2014:27, Figure 7, bottom shelf, middle). The image was provided to us by Thomas Tower III.

Just below we describe the crucible and its 10 tarring pebbles. Following that, we explore two ideas inspired by the circumstance of 10 tarring pebbles sequestered within the pot: (1) some basket makers had perhaps waterproofed their Cuyama containers by pouring a mix of melted tar and pebbles directly down into the neck of the basket; a crucible’s handle would allow a steady hand for the procedure; or (2) heated pebbles may have been inserted into the woven container after pouring the melted tar. Following those discussions there is additional contemplation regarding waterproofing that develops from closer scrutiny of Nidever’s (1961a, 1961b) observations.

### *Descriptions*

Thomas Tower’s find (Figure 5 and 6) was given a catalog designation (TT#1) by a volunteer staff member at the Point Vicente Interpretive Center (PVIC), Rancho Palos Verdes, where the artifact is presently on display. Specimen TT#1 was fashioned of a medium grained, somewhat micaceous steatite typical of many cups, bowls, and comals employed by the Gabrielino/Tongva and Chumash during at least the latter half of the Late Holocene. There is little question that the artifact’s soapstone material was quarried on Santa Catalina Island (see e.g., Schumacher 1878, 1879; Holmes 1902:183–184; Kroeber 1925:629–630; Heizer and Treganza 1944:306–307; Wlodarski 1979; McCawley 1996:136–137). Specimen TT#1 was almost certainly crafted on the island and transported by *tomol*, or plank canoe, to either the shores of Santa Monica Bay or less likely to Palos Verdes Peninsula or to San Pedro Bay.

Further confirmation of function observes that thick black tar coats the receptacle’s inner surfaces. All other surfaces—outer walls, rim, and even the handle—show varied amounts of the black substance.

Maximum length of the crucible is 237 mm, and maximum height is 109 mm. Width is 163 mm. The specimen weighs 2,478 g.

The artifact’s tarring pebbles (see Figure 6) have a PVIC catalog designation, TT#2. Table 1 provides maximum diameters and weights for the 10 specimens.

The PVIC invites the public to view the crucible and many more Native peoples’ artifacts within their educational facility which also features local flora and fauna, local geology, regional marine fossils, historic artifacts bearing on the whaling industry, etc.<sup>5</sup> The crucible is on extended loan, courtesy of the Tower family.

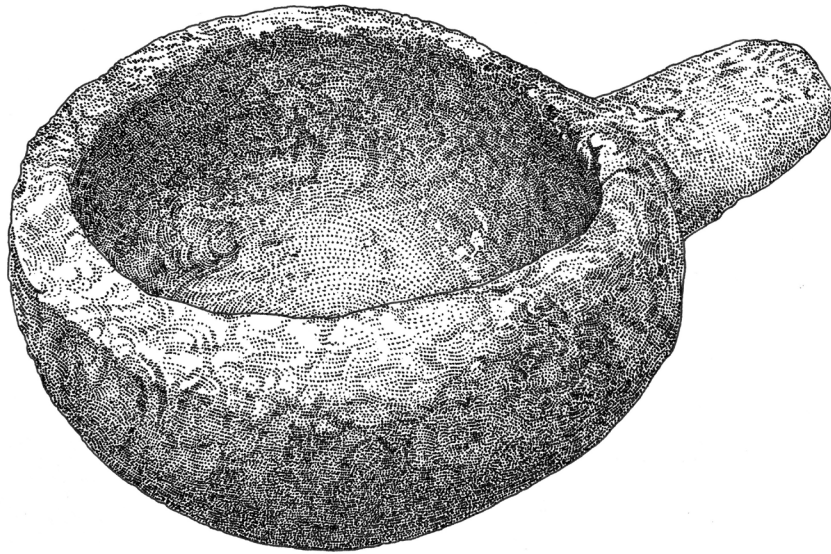


Figure 5. CA-LAN-138 (Malaga Cove site) steatite crucible. Drawn by Joe Cramer.



Figure 6. CA-LAN-138 asphaltum melting crucible and 10 tarring pebbles found inside the pot when it was excavated.

Table 1. Weights and Maximum Diameters for Ten Tarring Pebbles (TT#2) Found inside the Crucible (TT#1).

	Weight (g)	Diameter (mm)
Pebble 1	16	27
Pebble 2	19	27
Pebble 3	22	31
Pebble 4	23	29
Pebble 5	23	29
Pebble 6	23	30
Pebble 7	26	31
Pebble 8	26	31
Pebble 9	35	33
Pebble 10	35	33

### *Other Techniques Considered*

The circumstance of the LAN-138 soapstone melting pot holding 10 tarring pebbles inspires the suggestion that hot, viscous tar and heated pebbles were poured together from the handled crucible into Cuyama-style baskets and vigorously whirled around to effect waterproofing. An alternate hypothesis is that tarring pebbles were deployed only after melted tar had been poured into a Cuyama-style vessel. Had either technique actually occurred, and had the tar entered through the finished opening and neck of the bottle, the inner surfaces of a water bottle's neck would have acquired a coating of tar. Also, one might reasonably anticipate some spillage of hot petroleum occurring at the rim and dripping onto the exterior neck, where it might be spread about using a brush or scraper, thus conferring added strength to that particular part.

The majority of Cuyama-style water containers illustrated in published sources exhibit generous amounts of asphaltum at their openings and on their necks (see Figures 2, 3a, c–f); at the same time those receptacles have little to no obvious mastic on their exterior surfaces below the neck, with the normal exception of their the bases (see e.g., Kroeber 1925:Plate 5B; Mohr

and Sample 1955:Figure 100; Dawson and Deetz 1965:Plate 28; Craig 1966:Figure 2 or 1967:Plate 2; Hudson and Blackburn 1983:Items 97, 98; Dederer 1976:21; Rozaire 1977:31, Item 94; Grant 1987:531, Figure 1; Campbell 1999:34–38). In Mohr and Sample's (1955) examinations of Cuyama water bottles, all but one had tar on the exterior base. Their words are instructive:

The bottom is more subject to deformation than the sides owing to its shape, and, with contents weighing up to 30 kilograms, extra stiffening may have been needed to prevent cracking the lining [Mohr and Sample 1955:349].

Mohr and Sample (1955:349) also considered whether a bottle's neck was purposefully tarred. Since necks were small and projecting, and therefore subject to the "exigencies of use," they supposed that tar was applied to provide greater structural integrity.

Consider also that tar-coated rims and necks perhaps had something to do with providing an efficient fit of a stopper to the opening of the water bottle to prevent evaporation or spillage. Stoppers are documented in the ethnographic record (Craig 1967:98; Hudson and Blackburn 1983:Item 97.1). The mouth might be stopped merely with some tules bunched together, but there were more carefully crafted stoppers made of asphaltum (Hudson and Blackburn 1983:49–50, Figure 97.1-1).

An unusual example of a Cuyama-style water bottle with exterior neck and opening free of any asphaltum is the Juana Maria specimen seen in Figure 1 (Heizer 1960:Figure 1; see also Heizer and Elsasser 1973:frontispiece), but then we know that the "Lone Woman" had dropped pulverized tar into the jug and subsequently added heated pebbles. That is, the potential messiness of pouring hot, viscous tar does not apply here.



There is more to consider regarding the ethnohistoric notes pertaining to Juana Maria's basketry making. Previously referenced above was the fact that the "Lone Woman," after evenly tar coating her vessels' inner walls, ejected together excess asphaltum and pebbles. Nidever's (1961b:44) words, "thrown out," should occasion some pause. Specifically, the narrow neck and opening of woven water bottles belies the quick, easy exit implied by "thrown out." This would be especially so for the seemingly anomalous specimen seen in Figure 1 with its neck length a whopping 39 percent or so of the artifact's total height. Recall that Nidever (1961a:20) estimated the tarring pebbles to be walnut sized and that Fernando Librado gave a diameter of about "2 in" for each of the six heated stones (Craig 1966:210, 1967:98).

The circumstance of pebbles and surplus tar "thrown out" would accord better with basketry not yet finished, that is, with the upper end offering a comparatively wide opening for easy entrance and exit. In one Nidever account of Juana Maria making demijohn-shaped water bottles, one reads that "of the several baskets she was working [on], not one of them was completed, although she would work first on one, then on the other" (Nidever 1961a:19–20). Also recorded is the following:

She had several of these [demijohn-shaped] baskets in process of construction when we found her. She would work at one a few minutes, abandon it, and try another. I am not sure she ever completed one when with us [Nidever 1961b:44].

These statements suggest that the pieces of asphaltum and heated tarring pebbles may have entered the woven containers through apertures wider than those of the completed baskets with their more constricted necks and openings. If so, unfinished baskets should have facilitated discard of unneeded bitumen and

of pebbles that had spent some amount of their heat energy.

Did craftswomen ever pour molten tar, with or without pebbles, out of crucibles and down into uncompleted openings, subsequently extracting excess mastic and the tarry stones through those openings? If so, tarred necks would have resulted from a further step, intended likely, as per Mohr and Sample (1955:349), to provide structural soundness for a part that becomes stressed from use.

Parenthetically, several of the Cuyama bottles have unusual features, and we pass along the following information as points of interest. Craig (1967:Plate 2A) pictures a water bottle whose asphaltum occurs only at the object's flattened underside (outside surface). Campbell (1999:36) provides photographs showing a Chumash water bottle from Wellman Canyon, Sisquoc area, with a very heavy coating of tar on its exterior bottom. The point of interest here is that the bottom has a "concave dimple," a device not unlike kickups at the bottoms of many glass wine bottles.<sup>6</sup> Another interesting water bottle was tarred on its neck and shoulder in order to append rectangular abalone shell insets (Dawson and Deetz 1965:Plate 28d). Paul Schumacher recovered from a Catalina Island site part of a water bottle having a large circular abalone shell for ornamentation (Putnam 1879:246). Also noteworthy is the purposeful damage inflicted on the large Bowers Museum specimen (Figure 2), specifically, material cut away from the neck and a hole cut at a bottom edge. Rozaire (1977:31) wrote, "It is thought that this bottle was 'ritually killed.'"

### Summary and Concluding Thoughts

Ethnohistoric and ethnographic documentations attest to a basic method of waterproofing Cuyama-style baskets (Nidever 1961a:20, 1961b:44; Craig 1966:210, 1967:98). Pulverized asphaltum was introduced into

the woven receptacle, covering the inside bottom, after which hot tarring pebbles were dropped onto the bitumen. As melting proceeded, vigorous rotary force whirled the pebbles about, spreading sticky mastic over interior walls. In some cases mud was applied to the baskets' exterior surfaces, thus preventing melted tar from oozing out. Some craftswomen allowed the mud to remain, while others washed it off.

Thomas Tower's find of an asphaltum crucible containing 10 tarring pebbles first inspired our thought that there was possibly a second basic method, one that involved heated tar and pebbles poured together from a handled crucible into the demijohn-shaped baskets, followed by swirling the mix. Further reflection allowed that the tarring pebbles were possibly added into the receptacle to be swirled about only after melted asphaltum had been poured. Regardless of method, tar and pebbles could have entered and exited the receptacle through either a completed neck or through a not yet completed neck opening.

The handle of the steatite melting pot speaks to a requirement for careful control. One wonders whether crucibles with handles were specific or nearly so to the manufacture of water bottles.

In the production of Cuyama-style baskets, some pebbles may have glued fast to interiors, their disengagements perhaps coincident with the containers' eventual deterioration. While a grouping of tarring pebbles discovered in a midden might be the outcome of such a scenario, such evidence is not sufficient for inferring the past presence of a Cuyama water container. Caution dictates consideration of other circumstances, such as mere storage, that leave similar footprints.

The standout water bottle among the many specimens encountered in our literature search is the one shown in Figure 1 (see also Heizer 1960:Figure 1). No other examples were encountered that sported

such a proportionally long neck. Given that Nidever (1961a:19–20, 1961b:44) could not recall a single completed water bottle by Juana Maria's hand when on San Nicolas Island, we suppose that the long-necked artifact was either fashioned or completed at Santa Barbara, where the "Lone Woman" was looked after by Nidever's wife (Nidever 1961b:44–45). The Nicoleño woman perhaps saw an especially long-necked demijohn glass bottle and subsequently modeled her water container after it. Perhaps her hosts had requested that design. To the point, the handiwork seen in Figure 1 may have been unique to Juana Maria's creative output, an anomalous shape.

We hope this essay prompts experimental archaeology that might compare the merits of the documented method of tar coating water bottles against methods not historically documented but speculated to have involved melted tar poured into baskets to effect waterproofing.

#### End Notes

1. When Mohr and Sample (1955:348–350) proposed "Cuyama" as the name for this particular style of basketry, they drew a distinction between it and the generally wider-mouthed "Great Basin" type with its coating inside and out using vegetal pitch (1955:352–353). (Two superbly crafted Paiute water bottles, both small mouthed and each sealed inside and out with pinyon gum, are shown in Rozaire [1977:45, Figure 79].) Parenthetically, virtually the same kind of water jug as the Gabrielino/Chumash Cuyama type was used in the southern San Joaquin Valley (Wedel 1941:126–127, Plate 4b; Walker 1947:10, 29–30; Wallace 1978:451, Figure 3; see also Driver 1937:78).

2. There is evidence for Cuyama receptacles serving on occasion as containments for seeds and nuts (see Mohr and Sample 1955:351). Further, some few specimens became so modified as to preclude use as either water container or small granary, but rather in

their final functions they had possibly wrapped around somewhat bulky items (Mohr and Sample 1955:351).

3. Varied kinds of baskets were pitched with bituminous tar to prevent loss of contents (see e.g., Hoffman 1885:33, Note 14; Drucker 1937:20, 45; Anonymous 1937; Harrington 1942:12, 22; Jones 1956:Plate 131; Elsasser and Heizer 1963:4–13; Grant 1964:8–9, Plates 4a, b, c, 5b; Craig 1966:212, 1967:92, 103–105; Pohorecky 1976:49–50; Elsasser 1978:635; Hudson and Blackburn 1982:Item 95, 1983:Items 99, 105, 113, 136, 145, pp. 112–117, 146–147, Figure 119-3, 178, 181, Figure 131-13). Tar might be applied over only interior walls of some baskets, while others were slathered with mastic just on outer surfaces. Less common were those woven containers with tarry sealant covering both insides and outsides. The basket hopper mortar was a special case, since only the rim of its open bottom received melted bitumen to glue it atop a stone mortar. Some asphaltum on baskets resulted from repair work (see Mohr and Sample 1955:350).

4. Tarring pebbles were not the only tools used to pitch baskets. Tools used to tar outer surfaces of baskets and presumably, at times, used to work baskets' inner surfaces, included pliant applicators such as brushes of bundled vegetal fibers attached to a wooden handle (see Hudson and Blackburn 1987:Item 442). Some brushes might have been little different from those used for hair care, like the specimen with an asphaltum handle shown in Putnam (1879:249, Figure 123).

The tarring tool inventory included inflexible applicators such as the shale instrument with asphaltum stain at its more pointed end that is pictured in Hudson and Blackburn (1987:Figure 440-4). Harrington (1928:Plate 14, 91) illustrated and listed what he called “tarred stones,” generally oblong, waterworn, rounded rocks that in most cases had asphaltum staining at only one end. He did not discuss function, but David Banks Rogers was undoubtedly referring to these kinds of

objects when he drew a parallel between such stone applicators and the modern soldering iron:

The method of applying ... mineral tar was simple. One end of a long stone was heated and held against a cake of the material, until it ran to the desired place, where it hardened quickly, adhering closely to every object with which it came in contact ... the technique was very much like that of a tinsmith when using his soldering iron [Rogers 1929:365].

Rogers' analogy does not follow from any ethnographic or ethnohistoric data known to us, and we suspect such stones were merely applicators that had been dipped into molten tar. Parenthetically, Heizer uncritically repeated Rogers' idea of the soldering iron technique (1943:74).

Not all rigid applicators would have been stone. Some were probably no more than small sticks (see Voegelin 1938:30). Jones (1956:228, Plate 98d) illustrated a *Halotis* shell and a *Lottia gigantia* shell, both filled with asphaltum, the latter containing two bone applicators.

In the case of comparatively flat basketry containers, applicators might have been unnecessary. Consider the parching tray tarred on its inside surface; hot tar could be poured into the tray and then tipped to and fro, allowing the melted asphaltum to run thickly to all edges (Craig 1967:110; see also Dawson and Deetz 1965:201). We suppose that in any further effort to effect greater evenness to the layering, a tarring rag could easily accomplish the purpose.

5. Point Vicente Interpretive Center: 31501 Palos Verdes Drive West, Rancho Palos Verdes, CA 90275; 310-377-5370.

6. Campbell (2007:20, lower right) illustrated a similar “nipped bottom,” but of a Hualapai (Walapai)

water bottle that had been sealed with a mixture of pine pitch and powdered ochre. The Hualapai live along the Colorado River, north of the Mohave people, at the northwestern edge of the Southwest culture area.

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### References Cited

- Abbott, C. C.  
1879 Steatite Cooking Pots, Plates, and Food Vessels. In *Report Upon United States Geographical Surveys West of the One Hundredth Meridian* Vol. VII-Archaeology, edited by Frederick W. Putnam, pp. 93–116. Government Printing Office, Washington, D.C.
- Anonymous  
1937 *Asphalted (Tarred) Artifacts*. WPA Anthropological Project #4465. Report on file, Langson Library (Special Collections), University of California, Irvine.
- Bancroft, Hubert H.  
1874 *The Native Races of the Pacific States*, Vol. 1. D. Appleton, New York.
- Bolton, Herbert E.  
1916 *Spanish Explorations in the Southwest, 1542–1706*. Scribner's, New York.
- Braje, Todd J., Jon M. Erlandson, and Jan Timbrook  
2005 An Asphaltum Coiled Basket Impression, Tarring Pebbles, and Middle Holocene Water Bottles from San Miguel Island, California. *Journal of California and Great Basin Anthropology* 25(2):207–213.
- Brandes, Ray  
1970 *The Costansó Narrative of the Portolá Expedition*. Hogarth Press, Newhall, California.
- Campbell, Paul Douglas  
1999 *Survival Skills of Native California*. Gibbs Smith, Salt Lake City.  
2007 *Earth Pigments and Paint of the California Indians: Meaning and Technology*. Paul Douglas Campbell, Los Angeles.
- Craig, Steve  
1966 Ethnographic Notes on the Construction of Ventureño Chumash Baskets: From the Ethnographic and Linguistic Field Notes of John P. Harrington. *Archaeological Survey, Annual Report, 1966* 8:201–214. Department of Anthropology, University of California, Los Angeles.  
1967 The Basketry of the Ventureño Chumash. *Archaeological Survey, Annual Report, 1967* 9:78–149. Department of Anthropology, University of California, Los Angeles.
- Dawson, Lawrence, and James Deetz  
1965 A Corpus of Chumash Basketry. *Archaeological Survey Annual Report, 1965* 7:193–276. Department of Anthropology, University of California, Los Angeles.
- Dedera, Don  
1976 Petroleum and the American Indians. *Exxon USA* 15(3):16–21.

- Dittman, Carl  
1961 Narrative of a Seafaring Life on the Coast of California. In *Original Accounts of the Lone Woman of San Nicolas Island*, edited by Robert Heizer and Albert Elsasser, pp. 5–12. Reports of the University of California Archaeological Survey No. 55. Department of Anthropology, Berkeley.
- Driver, Harold E.  
1937 *Culture Element Distributions: VI, Southern Sierra Nevada*. Anthropological Records Vol. 1, No. 2. University of California Press, Berkeley.
- Drucker, Philip  
1937 *Culture Element Distributions: V, Southern California*. Anthropological Records Vol. 1, No. 1. University of California Press, Berkeley.
- Eastwood, Alice (editor)  
1924 Archibald Menzies' Journal of the Vancouver Expedition. *California Historical Society Quarterly* 2(3):264–340.
- Elsasser, Albert B.  
1978 Basketry. In *California*, edited by Robert F. Heizer, pp. 626–641. Handbook of North American Indians, Vol. 8, William C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
- Elsasser, Albert B., and Robert F. Heizer  
1963 The Archaeology of Bower's Cave, Los Angeles County, California. *Reports of the University of California Archaeological Survey* No. 59:1–59. Department of Anthropology, Berkeley.
- Grant, Campbell  
1978 Interior Chumash. In *California*, edited by Robert F. Heizer, pp. 530–534. Handbook of North American Indians, Vol. 8, William C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
- Harrington, John Peabody  
1942 *Culture Element Distributions: XIX, Central California Coast*. Anthropological Records Vol. 7, No. 1. University of California Press, Berkeley and Los Angeles.
- Heizer, Robert F.  
1943 Aboriginal Use of Bitumen by the California Indians. In *Geologic Formations and Economic Development of the Oil and Gas Fields of California*. Prepared under the direction of Olaf P. Jenkins, p. 74. California Division of Mines Bulletin 118 (Pt. 1). Ferry Building, San Francisco. [reprinted 1948]  
1960 A San Nicolas Island Twined Basketry Water Bottle. In *Papers on California Archaeology: 76-88*. Reports of the University of California Archaeological Survey No. 50, pp. 1–3. Department of Anthropology, Berkeley.  
1968 *The Indians of Los Angeles County: Hugo Reid's Letters of 1852*. Southwest Museum Papers No. 21. Southwest Museum, Los Angeles.  
1970 More J. P. Harrington Notes on Ventureño Chumash Basketry and Culture. In *Papers on California Ethnography*. Contributions of the University of California Archaeological Research Facility 9:59–77. Department of Anthropology, Berkeley.
- Heizer, Robert F., and Aden E. Treganza  
1944 Mines and Quarries of the Indians of California. *California Journal of Mines and Geology* 40(3):291–359.
- Hemert-Engert, Adolph von, and Frederick Teggart (editors)  
1910 *The Narrative of the Portolá Expedition of 1769–1770 by Miguel Costansó*. Publications

- of the Academy of Pacific Coast History Vol. 1, No. 4. The University Press, University of California, Berkeley.
- Heye, George C.  
1921 *Certain Artifacts from San Miguel Island, California*. Indian Notes and Monographs Vol. 7, No. 4. Museum of the American Indian, Heye Foundation, New York.
- Holmes, William Henry  
1902 *Anthropological Studies in California. Annual Report of the Board of Regents of the Smithsonian Institution Showing the Operations, Expenditures, and Condition of the Institution for the Year 1900*. 1900:155–187. Government Printing Office, Washington, D.C.
- Hoffman, W. J.  
1885 Hugo Reid's Account of the Indians of Los Angeles County, California. *Bulletin of the Essex Institute* 17(1–3):1–35. Salem, Massachusetts.
- Hudson, Travis, and Thomas C. Blackburn  
1982 *The Material Culture of the Chumash Interaction Sphere, Volume I: Food Procurement and Transportation*. Ballena Press Anthropological Papers No. 25. A Ballena Press/Santa Barbara Museum of Natural History Cooperative Publication, Los Altos, California, and Santa Barbara, California.
- 1983 *The Material Culture of the Chumash Interaction Sphere, Vol. II: Food Preparation and Shelter*. Ballena Press Anthropological Papers No. 27. A Ballena Press/Santa Barbara Museum of Natural History Cooperative Publication, Menlo Park, California, and Santa Barbara, California.
- 1986 *The Material Culture of the Chumash Interaction Sphere, Vol. IV: Ceremonial Paraphernalia, Games, and Amusements*. Ballena Press Anthropological Papers No. 30. A Ballena Press/Santa Barbara Museum of Natural History Cooperative Publication, Menlo Park, California, and Santa Barbara, California.
- 1987 *The Material Culture of the Chumash Interaction Sphere, Vol. V: Manufacturing Processes, Metrology, and Trade*. Ballena Press Anthropological Papers No. 31. A Ballena Press/Santa Barbara Museum of Natural History Cooperative Publication, Menlo Park, California, and Santa Barbara, California.
- Jones, Phillip Mills  
1956 *Archaeological Investigations on Santa Rosa Island in 1901*. Anthropological Records Vol. 17, No. 2. University of California Press, Berkeley and Los Angeles.
- Koerper, Henry C.  
1995 *The Christ College Project Archaeological Investigations at CA-ORA-378, Turtle Rock, Irvine, California, Vol. 2*. CRM report prepared for Fieldstone Communities, Inc., Newport Beach. On file, South Central Coastal Information Center, California State University, Fullerton.
- Koerper, Henry C., Galen Hunter, and Ivan Snyder  
2014 Five Effigies with Possible to Probable Cetaan Referent. *Pacific Coast Archaeological Society Quarterly* 49(1 and 2):21–36.
- Koerper, Henry C., Paul E. Langenwalter, and Adella Schroth  
1991 Early Holocene Adaptations and the Transition Phase Problem: Evidence from the Allan O. Kelly Site, Agua Hedionda Lagoon. In *Hunter-Gatherers of Early Holocene Coastal California*, edited by Jon M. Erlandson and Roger H. Colton, pp. 43–62. Perspectives in California Archaeology, Vol. 1, Jeanne E. Arnold,

- senior series editor, Institute of Archaeology, University of California, Los Angeles.
- Koerper, Henry C., and Mark L. Peterson  
2014 On the Anatomy of the Malaga Cove Site. *Pacific Coast Archaeological Society Quarterly* 49(1 and 2):37–62.
- Koerper, Henry C., Armand J. Labbé, and A. J. T. Jull  
2005 An Abalone “Treasure Pot” from Coastal Southern California. *Pacific Coast Archaeological Society Quarterly* 38(2 & 3):87–97.
- Kroeber, Alfred A.  
1925 *Handbook of the Indians of California*. Smithsonian Institution Bureau of American Ethnology Bulletin 78. Government Printing Office, Washington, D.C.
- Lamb, Frank W.  
1972 *Indian Baskets of North America*. Riverside Museum Press, Riverside, California.
- McCawley, William  
1996 *The First Angelinos, The Gabrielino Indians of Los Angeles*. A Malki Museum Press/Ballena Press Cooperative Publication. Banning, California, and Novato, California.
- Mohr, Albert, and L. L. Sample  
1955 Twined Water Baskets of the Cuyama Area, Southern California. *American Antiquity* 20(4):345–354.
- Nidever, George  
1961a Document 1B: The Life and Adventures of a Pioneer of California Since 1834. In *Original Accounts of the Lone Woman of San Nicolas Island*, edited by Robert F. Heizer and Albert B. Elsasser, pp. 12–22. Reports of the University of California Archaeological Survey No. 55. Department of Anthropology, Berkeley.
- 1961b Document 2B: The Lost Woman. From Thompson and West’s *History of Santa Barbara County*, 1883. In *Original Accounts of the Lone Woman of San Nicolas Island*, edited by Robert F. Heizer and Albert B. Elsasser, pp. 28–37. Reports of the University of California Archaeological Survey No. 55. Department of Anthropology, Berkeley.
- Olson, Ronald L.  
1930 *Chumash Prehistory*. University of California Publications in American Archaeology and Ethnology Vol. 28, No. 1. University of California Press, Berkeley.
- Priestly, Herbert Ingram (translator)  
1937 *A Historical, Political, and Natural Description of California by Pedro Fages, Soldier of Spain, Dutifully Made for the Viceroy in the Year 1775*. University of California Press, Berkeley.
- Pohorecky, Zenon Stephen  
1976 *Archaeology of the South Coast Ranges of California*. Contributions of the University of California Archaeological Research Facility No. 34. Department of Anthropology, Berkeley.
- Putnam, Frederick W.  
1879 Textile Fabrics, Basket-Work, Etc. In *Report Upon United States Geographical Surveys of the One Hundredth Meridian* Vol. VII-Archaeology, edited by Frederick W. Putnam, pp. 239–250. Government Printing Office, Washington, D.C.
- Rau, Charles C.  
1876 *The Archaeological Collection of the United States National Museum, in Charge of the Smithsonian Institution, Washington, D.C.* Smithsonian Institution Contributions to Knowledge 287, Washington, D.C.

- Rogers, David Banks  
1929 *Prehistoric Man of the Santa Barbara Coast*. Santa Barbara Museum of Natural History, Santa Barbara, California.
- Rozaire, Charles E.  
1977 *Indian Basketry of Western North America: From the Collection of the Bowers Museum, Santa Ana, California*. Brooke House, Los Angeles.
- Schumacher, Paul  
1878 Ancient Olla Manufactory of Santa Catalina Island, California. *American Naturalist* 12(9):629.  
1879 The Method of Manufacture of Soapstone Pots. In *Report Upon United States Geographical Surveys West of the One Hundredth Meridian* Vol. VII-Archaeology, edited by Frederick W. Putnam, pp. 117–121. Government Printing Office, Washington, D.C.
- Sutton, Mark Q.  
2010 The Del Rey Tradition and Its Place in the Prehistory of Southern California. *Pacific Coast Archaeological Society Quarterly* 44(2):1–54.
- Taylor, Alexander  
1863 The Indianology of California, *The California Farmer and Journal of Useful Sciences* 24 July:Col. 143. San Francisco.
- Tower, Thomas  
1942 Stone Age People of Malaga Cove, Prehistoric and Historic. Copy of typed manuscript available at the Point Vicente Interpretive Center, Rancho Palos Verdes, Los Angeles County, California. Available also with both the Edwin Walker Collection and the William Wallace Collection, Braun Research Library, Autry National Center, Los Angeles.
- Vellanoweth, Rene L., M. R. Lambright, Jon M. Erlandson, and Torben Rick  
2003 Early New World Maritime Technologies: Sea Grass Cordage, Shell Beads, and a Bone Tool from Cave of Chimneys, San Miguel Island, California, USA. *Journal of Archaeological Science* 30(9):1161–1173.
- Voegelin, Erminie  
1938 *Tübatulabl Ethnography*. Anthropological Records Vol. 2, No. 1. University of California Press, Berkeley.
- Wagner, Henry R.  
1929 *Spanish Voyages to the Northwest Coast of America in the Sixteenth Century*. California Historical Society Special Publications 4. San Francisco.
- Walker, Edwin Francis  
1937 Sequence of Prehistoric Culture at Malaga Cove, California. *The Masterkey* 11(6):210–214.  
1947 Excavation of a Yokuts Indian Cemetery. Kern County Historical Society, Bakersfield, California.  
1951 *Five Prehistoric Archeological Sites in Los Angeles County, California*. Publications of the Frederick Webb Hodge Anniversary Publications Fund Vol. 6. Southwest Museum, Los Angeles.
- Wallace, William J.  
1978 Southern Valley Yokuts. In *California*, edited by Robert F. Heizer, pp. 448–461. Handbook of North American Indians, Vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.  
2002 Toloache Mortars (?) from the Palos Verdes Peninsula. In *Essays in California Archaeology: A Memorial to Franklin Fenenga*, edited by William J. Wallace and Francis A. Riddell,



- pp. 142–147. Contributions of the University of California Archaeological Research Facility No. 60. Berkeley.
- Wedel, Waldo R.  
1941 *Archaeological Investigations at Buena Vista Lake, Kern County, California*. Bureau of American Ethnology Bulletin 130. Smithsonian Institution, Washington, D.C.
- Wlodarski, Robert J.  
1979 Catalina Island Soapstone Manufacture. *Journal of California and Great Basin Anthropology* 1(2):331–355.
- Woodward, Arthur  
1959 *The Sea Diary of Fr. Juan Vizcaino to Alta California, 1769*. Glen Dawson, Los Angeles.